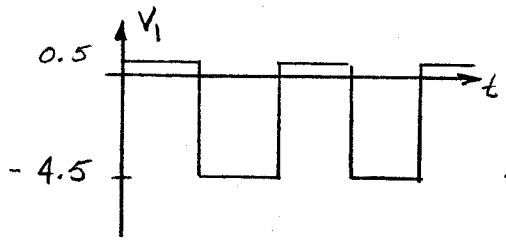


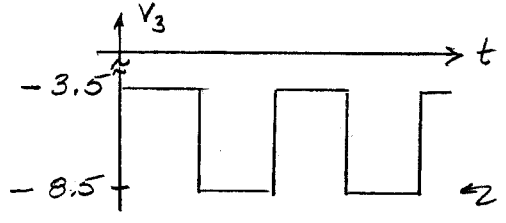
ECE 302 - HW # 4 - SOLUTION - 30 POINTS

1) From p 46 of CH 2, ONE NEGATIVE CLAMP WITH  $V_R = 0$  YIELDS



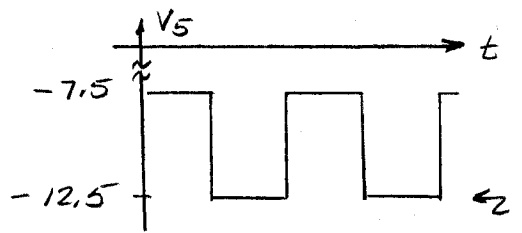
A NEGATIVE PEAK DETECTOR  
 YIELDS  $-4V = -V_m + 2V_{D(ON)}$

A SECOND NEGATIVE CLAMP USING THE LAST VOLT. AS REF. YIELDS



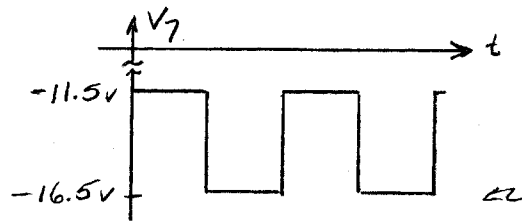
A NEGATIVE PEAK DETECTOR  
 YIELDS  $-8V = -2V_m + 4V_{D(ON)}$

A THIRD NEGATIVE CLAMP USING THE LAST VOLT. AS REF YIELDS



A NEGATIVE PEAK DETECTOR  
 YIELDS  $-12V = -3V_m + 6V_{D(ON)}$

A FOURTH NEGATIVE CLAMP USING THE LAST VOLT. AS REF. YIELDS



A NEGATIVE PEAK DETECTOR  
 YIELDS  $-16V = -4V_m + 8V_{D(ON)}$

THIS SHOULD WORK - SEE P 2

AT  $t=0$ ,

$V_{C1} = 5 - 0.5 = 4.5V$

$V_{C2} = 4V$

$V_{C3} = 5 - (-3.5) = 8.5V$

$V_{C4} = 8V$

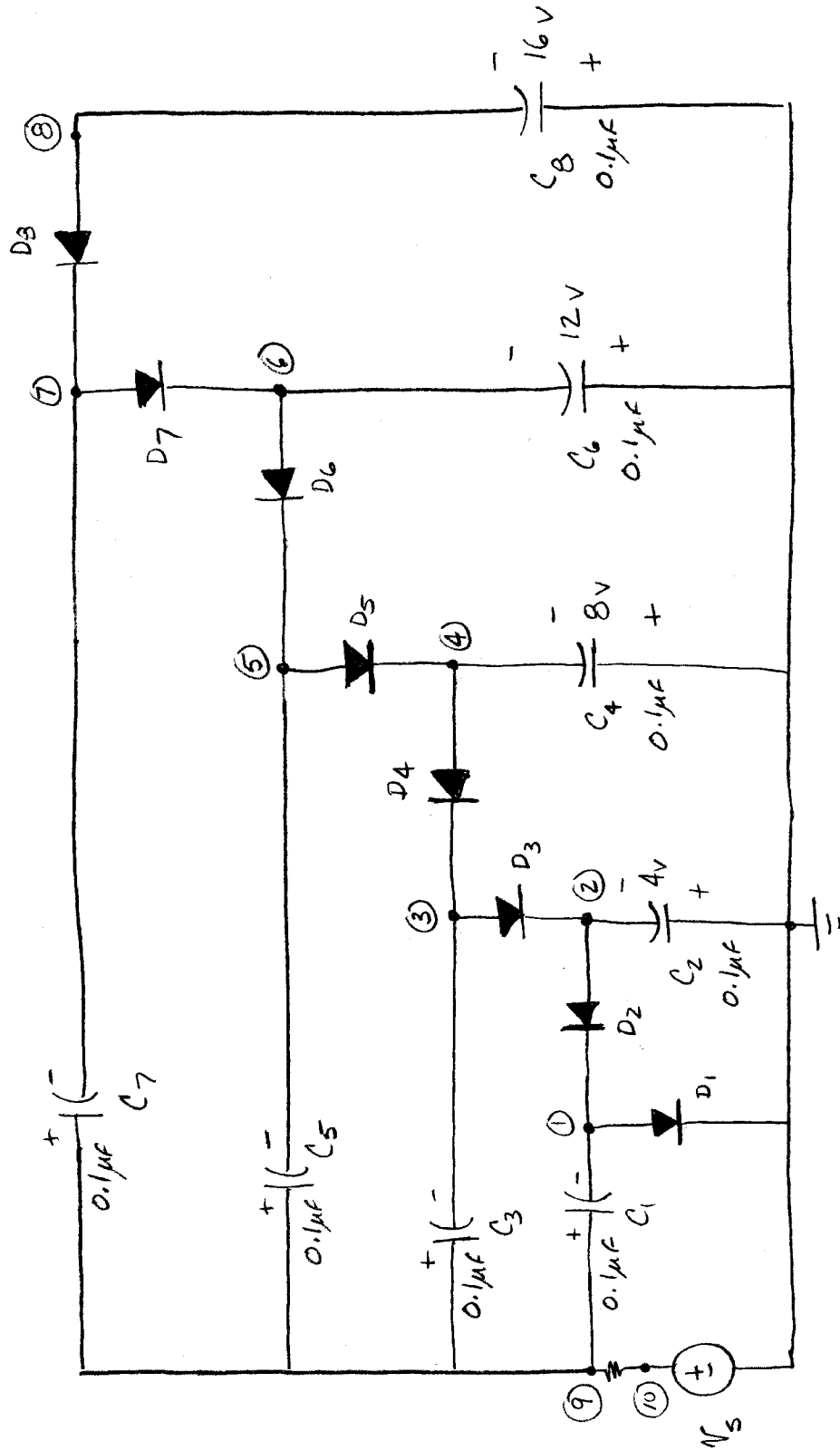
$V_{C5} = 5 - (-7.5) = 12.5V$

$V_{C6} = 12V$

$V_{C7} = 5 - (-11.5) = 16.5V$

$V_{C8} = 16V$

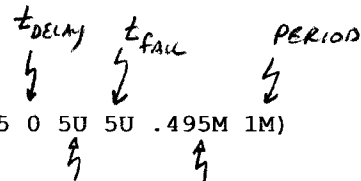
# FINAL DESIGN

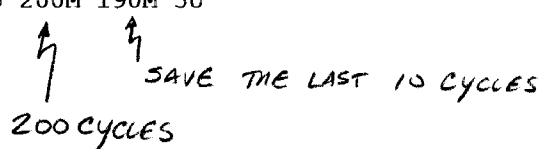


B) FOR A 1MSEC PERIOD TO HAVE 200 DATA POINTS THE PRINT STEP SHOULD BE  $\frac{1m}{200} = 5\mu\text{SEC}$ . THIS IS ALSO THE MINIMUM RISE AND FALL TIME.

```

-15 Volt Design
Vs 10 0 PULSE (0 5 0 5U 5U .495M 1M)
Rs 10 9 10
C1 9 1 .1U
C2 0 2 .1U
C3 9 3 .1U
C4 0 4 .1U
C5 9 5 .1U
C6 0 6 .1U
C7 9 7 .1U
C8 0 8 .1U
D1 1 0 DMOD
D2 2 1 DMOD
D3 3 2 DMOD
D4 4 3 DMOD
D5 5 4 DMOD
D6 6 5 DMOD
D7 7 6 DMOD
D8 8 7 DMOD
.MODEL DMOD D (IS=1.1N N=1.2)
.PROBE
.TRAN 5U 200M 190M 5U
.END
    
```

$t_{\text{DELAY}}$        $t_{\text{FALL}}$       PERIOD  
  
 $t_{\text{RISE}}$        $\frac{1}{2} \text{PERIOD} - t_{\text{RISE}}$



- $V_{\text{OUT}} = -18.213\text{V}$  ON THE NEXT PAGE.
- WE EXPECTED  $-16\text{V}$  BASED ON  $V_{D(\text{ON})} \cong 0.5\text{V}$  BUT THE MEASURED  $V_{D(\text{ON})}$  (TOP OF  $V_i$ ) ON THE NEXT PAGE IS APPROXIMATELY  $0.235\text{V}$  THIS IS A CONSEQUENCE OF THE ACTUAL  $I_S$  AND  $\eta$ .
- THUS THE PREDICTED  $V_o = -4V_m + 8V_{D(\text{ON})}$   
 $= -4(5) + 8(0.235) = -18.12\text{V}$

-15 Volt Design,...

Temperature: 27.0,...

